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FLORIDA'S WATER CRISIS

# The body toxic

**By Debbie Salamone |** Sentinel Staff Writer
Posted July 28, 2002

The newest water-pollution threat starts with a simple cup of coffee, a smoke break, a spray of cologne, a few headache pills or some cholesterol-lowering medicine.

Thousands of man-made chemicals and drugs are designed to soothe, clean and heal the human body. But when we wash off the remnants in the shower or flush them out of our bodies into the toilet, the byproducts of our individual habits can accumulate to corrupt our common water sources, new research suggests.

Tiny amounts of everyday products ranging from caffeine and hormones to antibiotics and detergents survive in wastewater throughout the country even after it is cleaned and disinfected. Much of that treated wastewater is then flushed into rivers, sprayed on lawns or put underground to replenish drinking-water supplies.

Today, chapter eight of the Orlando Sentinel's yearlong series on Florida's water crisis examines how Florida's push to find new water sources might be running headlong into this most personal of pollution sources: The body toxic.

Contamination from drugs and personal products is an emerging challenge for scientists, used to dealing with more-traditional, outdoor pollutants such as pesticides. Researchers never thought drugs and chemicals used inside homes would get into the environment, partly because they are used in such small amounts. So, neither wastewater nor drinking-water processes have been designed specifically to eliminate them, unlike other common pollutants for which federal safety standards have been set.

"It's possible people are drinking some of these," said Herb Buxton, a toxic-substances expert with the U.S. Geological Survey in New Jersey.

**Long-term effects unknown**

No one knows how many of these trace chemicals actually may survive the lengthy journey from wastewater to the water faucet. Also unknown are the long-term, cumulative consequences of drinking water laced with minute amounts of other people's drugs and chemicals.

"The long-term consequences could be very severe," said David Schubert, a researcher with the Salk Institute for Biological Studies in California.

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The contaminators. (GEORGE SKENE/ORLANDO SENTINEL)
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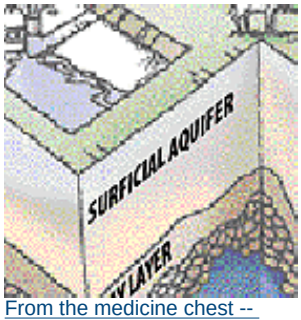
GRAPHICS

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Researchers suspect the release of antibiotics and hormones could be contributing to the growth of antibiotic-resistant bacteria and hormonal imbalances in wildlife. Scientists want more studies to assess whether these pollutants could cause reproductive troubles and cancer in people.

For now, they have more questions than answers.

"You have to be very careful not to inflame the issue," cautioned Christian Daughton, an environmental chemist with the U.S. Environmental Protection Agency's National Exposure Research Laboratory.

Not so long ago, Florida had few worries about this new national threat. Most drinking water in our state comes from underground aquifers -- not rivers and streams, as in many other states.

But with underground-water levels reaching critical lows in some areas, more Floridians will drink from rivers where drugs and chemicals can seep into the water from treated wastewater, leaching septic tanks and farms. At the same time, scientists are planning to route treated wastewater underground to bolster the state's dwindling aquifer.

Many water managers express reluctance to shelve such plans and wait for results from cutting-edge research assessing new contaminants.

"We're faced with a serious groundwater shortage," said Barbara Vergara, a top water-supply manager with the St. Johns River Water Management District, which manages water supply in 19 counties, including much of Central Florida. "I wouldn't want to totally discount good projects because of these unknowns."

The levels of the compounds are small and measured scientifically as parts per billion or less. That amount is so minuscule, it equates to one second in 32 years. Taken another way, you'd have to drink 10,000 liters of water containing trace amounts of caffeine to get the hit of just one cup of coffee.

But even at those small levels, the concern about these contaminants looms potentially large.

"The issue is much more complex," the EPA's Daughton said. "It's like an elderly person who has many doctors prescribing medications. If they aren't careful, the person ends up taking 20 different medications. It can add up to a truly toxic effect."

**Unraveling a mystery**

Scientists now think that drugs and chemicals likely have been in waters wherever and for as long as pharmaceuticals and personal-care products have been used.

But until a few years ago, researchers didn't have the equipment or know-how to detect them. Europeans began research in the 1990s, and the first U.S. national study was completed this spring.

The U.S. Geological Survey tested waters throughout the country for 95 different chemicals, ranging from antibiotics

Photo gallery: Florida's water crisis (ORLANDO SENTINEL)



PHOTOS

More septics coming. (GEORGE SKENE/ORLANDO SENTINEL)
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Down the pipe. (BOBBY COKER/ORLANDO SENTINEL)
Jul 7, 2002

PHOTO GALLERY

Getting rid of old (ORLANDO SENTINEL)

to fragrances.

Of 139 streams studied in 30 states, 80. percent had at least a trace amount of one of the chemicals for which workers tested; half had seven or more.

Researchers found steroids, nonprescription drugs, insect repellent and detergent byproducts most often. Two study sites were in Florida. In the Suwannee River, workers found hormones, caffeine and an antibiotic typically used on chicken farms. In Itchepackesassa Creek near Plant City, which eventually feeds into the Hillsborough River, scientists found traces of caffeine, hormones and antibiotics.

Down the pipe (BOBBY COKER/ORLANDO SENTINEL)

**WATER CRISIS**

The *Sentinel's* yearlong series focuses attention on what many experts see as Florida's long-term water crisis.

As researchers create even more pharmaceuticals and more people of all ages take more medicines, the newest contaminants will become only more prevalent.

Just last year, U.S. prescription-drug sales alone grew 16.9. percent to $172. billion. In addition last year, U.S. consumers spent more than $18. billion on over-the-counter medications.

Documenting what's present in the environment and at what levels is the first step toward figuring out how the newest contaminants may affect wildlife and human health.

Research has shown that sex steroids from oral contraceptives and other similar chemicals can feminize male fish and change behaviors of either sex -- all with unknown consequences. Other research has shown antidepressants can make shellfish spawn too early or too late.

In Europe, some researchers have tied a decline in human-male sperm count to low levels of birth-control hormones in the environment.

The Salk Institute's Schubert said steroids from birth-control pills work at such tiny concentrations that there could be enough in wastewater to make certain cancerous prostate and mammary tumors grow more aggressively. But it will be years before studies can prove any hypotheses.

"For the politicians, that's fine because they won't be around to see it," he said. "But for the population, it's bad."

**The Florida experiment**

Dozens of major U.S. utilities draw water from rivers that at times are composed of more than 50. percent wastewater. Downstream cities drink what upstream cities discard.

That kind of situation is something Florida, for the most part, has avoided. But a booming population has forced the state to find more water. Rivers likely will play a key role as well as putting more recycled wastewater underground to replenish fresh drinking supplies.

For now, the possibility of danger ahead isn't real enough to put a wrench in any of those plans.

In Central Florida, where underground-water reserves are running dangerously low in some places, the St. Johns River could be the area's newest water supply. In areas near where drinking water may be withdrawn in Seminole County, the river receives limited wastewater on occasion. Initial tests near two farms farther upstream showed no signs of drugs in the water, project managers said.

In addition to river water, all of Florida is determined to re-use as much treated wastewater as possible. It is one of the cheapest and quickest ways to add more water into the pipelines and keep Florida's growth machine humming.

Already, Florida recycles more treated wastewater than any other state except

California. Most of it is sprayed on lawns and citrus groves, which has long been regarded as a safe use for treated wastewater.

But already, 16. percent of Florida's wastewater -- or 93. million gallons a day -- is put underground to replenish drinking-water supplies.

Water managers are considering more projects that would put even more water underground.

But the discovery of new contaminants raises questions about that strategy.

In 1998, the National Academy of Sciences called the idea of mixing wastewater into raw drinking water an "option of last resort" to be used only after conservation and other water sources are considered.

The group said the tactic is viable under the right circumstances but that there were many uncertainties about potential health risks of drinking reclaimed water.

But much time and money, especially in Florida, already have been invested in wastewater re-use projects. Plans for growth are dependent on that extra water. And many scientists think there isn't enough evidence to suggest there's a problem.

"The emerging pollutants of concern are very definitely on the radar screen, and we're interested in the research being done." said David York, Florida's state water-re-use expert. "But it really has not caused great alarm in the water-re-use community."

**Orange County out front**

Western Orange County is home to the largest wastewater reuse-replenishment program program of its kind in the world. An average 13. million gallons a day of treated wastewater percolates underground through large areas of sandy soils.

The project, called Conserv II, has raised aquifer levels in that area significantly and stands as a testament to how Florida can continue to grow despite running dangerously low on traditional groundwater supplies in some areas.

Conserv II collects wastewater from Orlando and Orange County households, businesses and industry. The sewage is cleaned, filtered and chlorinated.

The final water that goes underground is clean enough to drink, and the water travels at least a mile within the aquifer before it reaches any public wells, project managers say.

A one-day sampling conducted last year found that trace amounts of disinfectant and fragrance chemicals survived treatment and showed up in the finished wastewater. But no one knows for sure how many trace chemicals and drugs ultimately make it to the aquifer with the Conserv II wastewater.

Research in other states shows soils may remove a big chunk of the contaminants before they reach the deep aquifer. But scientists can't be certain that natural systems can battle all kinds of man-made compounds or whether any of what remains is dangerous for people.

They think believe drinking-water treatments probably reduce any remaining compounds further still.

"Until you have some proof, you don't go out and spend the taxpayers' money to make distilled water out of wastewater," said Tom Lothrop, Orlando's public-works deputy director.

Cleaning water to high levels, which can be done through distillation or reverse osmosis, has been shown in some studies to eliminate many of the newest contaminants. That's the approach being taken in Orange County, Calif.

In part to allay public fears about the new pollutants, water officials are zapping wastewater with a host of treatments before it is put in a lake and allowed to percolate into the underground aquifer. On top of traditional wastewater treatment used in most of Florida, California water officials are using advanced filtration, reverse osmosis, hydrogen peroxide and ultraviolet-light disinfection. The natural biological processes of

the lake treat the water further still before it seeps underground. Water officials are conducting intensive studies to ensure their methods are safe.

"We're very confident .. .. . we're in good shape," said Orange County, Calif., water-district spokesman Ron Wildermuth.

For now, Florida officials point to Los Angeles, where people have been drinking water replenished with wastewater since 1962. Health studies haven't found any health problems linked to drinking the water.

The Geological Survey is continuing and expanding its national studies on the emerging contaminants, and some Wwestern states are forging ahead with research. But there is no major statewide study planned for Florida.

"I'd feel a lot more comfortable if we knew more," said the water district's Vergara, who thinks tight budgets are preventing more study. "When you don't know something but there's a sense there could be a problem, it's like walking a tightrope. The truth is we have an indication it could be a problem down the road."

While scientists try to sort out the mixed messages, many of them agree that steps should be taken now to develop more environmentally friendly chemicals, minimize drug misuse and overuse, better tailor drug doses to individuals and find better disposal methods.

"We have to be careful," Vergara said. "I feel responsible not to make a mistake someone 50 or 100 years from now is going to have to deal with."

By then, Florida -- and many other places in the nation -- will be so hooked on reusing wastewater that it may be nearly impossible to kick the habit.

*Debbie Salamone can be reached at dsalamone@orlandosentinel.com or at 407-420-5456.*